Serial No. 10/727,385 _____   Docket No. H01541

CLAIMS

1.   (Currently amended)   A device for determining projection lens pupil transmission distribution in a photolithographic imaging system, the device comprising:

an illumination source;

a transmissive reticle;

an aperture layer having an illumination source side and a light emission side and comprising a plurality of openings therethrough;

a diffuser removably mounted on the illumination source side of the aperture layer;

a projection lens system; and

an image plane,

wherein a pupil image corresponding to each of the plurality of openings in the aperture layer is formed at the image plane when radiation from the illumination source passes through the reticle, the diffuser, the aperture layer and the projection lens system, the pupil image having a projection lens pupil transmission distribution,

wherein the diffuser may be removed for determination of the pupil transmission distribution.

2.   (Original)   A device as in claim 1, wherein the diffuser eliminates or substantially alters contributions of the illumination source aperture uniformity from the projection lens pupil transmission distribution.

3.   (Original)   A device as in claim 1, wherein the diffuser is configured to be oscillated during operation of the device.

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4.   (Original)   A device as in claim 1, wherein the diffuser at least partially homogenizes or randomizes one or more of intensity, spatial intensity distribution, phase, coherence and propagation direction of the radiation passing therethrough.

5.   (Original)   A device as in claim 1, wherein the diffuser is on an illumination source side of the reticle and the aperture layer is on a light emission side of the reticle.

6.   (Original)   A device as in claim 1, wherein both the diffuser and the aperture layer are on an illumination source side of the reticle.

7.   (Original)   A device as in claim 1, wherein both the diffuser and the aperture layer are on a light emission side of the reticle.

8.   (Original)   A device as in claim 1, wherein at least one of the diffuser and the aperture layer are supported by a frame.

9.   (Original)   A device as in claim 1, wherein at least one of the diffuser and the aperture layer are formed on a surface of the reticle.

10.   (Original)   A device as in claim 1, wherein at least one of the diffuser and the aperture layer are at least partially surrounded by or within the reticle and are supported thereby.

11.   (Original)   A device as in claim 1, wherein the image plane is substantially coplanar with a focal plane of light from the projection lens.

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12.   (Previously presented)   A method for determining projection lens pupil transmission distribution and illumination source aperture uniformity in a photolithographic imaging system, comprising:

    providing a photolithographic imaging system comprising:

        an illumination source;

        a transmissive reticle;

        an aperture layer having an illumination source side and a light emission side and comprising a plurality of openings therethrough; and

        a projection lens system;

    measuring first pupil intensity distribution of pupil images formed at an image plane by the openings in the aperture layer while passing radiation from the illumination source through the reticle, the aperture layer plate and the projection lens system;

        mounting a diffuser on the illumination source side of the aperture layer;

        measuring second pupil intensity distribution of images formed at the image plane by the openings in the aperture layer while passing radiation from the illumination source through the reticle, the diffuser, the aperture layer plate and the projection lens system; and

        comparing the first and the second pupil intensity distributions to determine intensity distribution of radiation emanating from the illumination source and the projection lens system.

13.   (Original)   A method as in claim 12, wherein the diffuser eliminates, substantially alters and/or decouples contributions to the pupil image arising from the illumination source aperture uniformity from the projection lens pupil transmission distribution.

14.   (Original)   A method as in claim 12, further comprising oscillating the diffuser while measuring second pupil intensity.

15.   (Original)   A method as in claim 12, wherein the first pupil intensity distribution substantially corresponds to combined effects of illumination source intensity distribution and projection lens pupil transmission distribution, and the second pupil intensity distribution substantially corresponds to projection lens pupil distribution.

16.   (Original)   A method as in claim 12, wherein the diffuser at least partially homogenizes or randomizes one or more of intensity, spatial intensity distribution, phase, coherence and propagation direction of the radiation passing therethrough.

17.   (Original)   A device for determining both illumination source aperture uniformity and projection lens pupil transmission distribution in a photolithographic imaging system, the device comprising:

an illumination source;

a transmissive reticle;

an aperture layer having an illumination source side and a light emission side and comprising a plurality of openings therethrough;

a diffuser removably mounted on the illumination source side of the aperture layer;

a projection lens system; and

an image plane,

wherein a first pupil image corresponding to each of the plurality of openings in the aperture layer is formed at the image plane when the diffuser is removed and radiation from the illumination source passes through the reticle, the aperture layer and the projection lens system, the first pupil image having a first pupil intensity distribution $P_{(x,y) \, no \, diffuser}$; and

wherein a second pupil image corresponding to each of the plurality of openings in the aperture layer is formed at the image plane when the diffuser is mounted and

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radiation from the illumination source passes through the reticle, the diffuser, the
aperture layer and the projection lens system, the second pupil image having a second
pupil intensity distribution $P_{(x,y) \text{ diffuser}}$, and

wherein the following relationships are defined:

$$P_{(x,y) \text{ diffuser}} = P_{(x,y) \text{ projection lens}} \qquad (1)$$

and

$$P_{(x,y) \text{ diffuser}} / P_{(x,y) \text{ no diffuser}} \cong P_{(x,y) \text{ illumination source}} \qquad (2).$$

18.   (Original)   A device as in claim 17, wherein the diffuser eliminates,
substantially alters and/or decouples contributions to the pupil image arising from the
illumination source aperture uniformity from the projection lens pupil transmission
distribution.

19.   (Original)   A device as in claim 17, wherein the diffuser is configured to
be oscillated during operation of the device.

20.   (Original)   A device as in claim 17, wherein the diffuser at least partially
homogenizes or randomizes one or more of intensity, spatial intensity distribution,
phase, coherence and propagation direction of the radiation passing therethrough.

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